Preventing Fractures and Falls: A Limited Role for Calcium and Vitamin D Supplements?

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EDITORIAL

Preventing Fractures and Falls
A Limited Role for Calcium and Vitamin D Supplements?

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Vitamin D and calcium are key nutrients to support bone development in children and young adults and to maintain muscle strength and neuromuscular coordination throughout the life span. Vitamin D deficiency is a well-defined risk factor for falls and hip fractures among older adults. It is unclear if supplementation with these nutrients is effective for the primary prevention of fractures among healthy community-dwelling adults.

In this issue of *JAMA*, the US Preventive Services Task Force (USPSTF) presents its recommendation statement on vitamin D and calcium supplementation to prevent fractures.[1] These recommendations were based on a careful and comprehensive review of the evidence to determine whether supplements containing vitamin D or calcium individually or in combination contribute to the primary prevention of fractures among community-dwelling, asymptomatic adults without a diagnosis of osteoporosis or vitamin D deficiency.[2] In a simultaneously published report, the USPSTF also presents its recommendation statement on interventions to prevent falls in older adults,[3] based on a comprehensive review of the evidence regarding strategies for fall prevention among community-dwelling adults 65 years or older, extending from vitamin D to exercise and multifactorial interventions.[4] Providing both guidelines in tandem is valuable, as the complementary articles reinforce the importance of fall prevention in reducing the risk of fractures (and other injuries) among older adults, who sustain 75% of all osteoporotic fractures.[5]

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Acknowledging the limited data available for primary prevention, the task force concluded "the current evidence is insufficient to assess the balance of the benefits and harms of vitamin D and calcium supplementation, alone or combined, for the primary prevention of fractures in community-dwelling, asymptomatic men and premenopausal women (I statement)."[1] It also recommended "against daily supplementation with 400 IU or less of vitamin D and 1000 mg or less of calcium for the primary prevention of fractures in community-dwelling, postmenopausal women (D recommendation)."[1] For daily supplementation with vitamin D doses greater than 400 IU and calcium doses greater than 1000 mg, the USPSTF concluded that "the current evidence is insufficient to assess the balance of the benefits and harms" for primary prevention of fractures in community-dwelling, postmenopausal women (I statement),[1] based on 2 large trials with inconsistent results.[6,7] For the higher dose of vitamin D, the USPSTF identified 1 large trial that tested 100 000 IU of vitamin D every 4 months and demonstrated a benefit on fracture risk[6] and 1 large trial that tested 100 000 IU of vitamin D monthly and did not find a benefit on fracture risk.[7]

With regard to possible harms of supplementation with vitamin D and calcium, the USPSTF found sufficient evidence that supplementation with calcium and vitamin D increases the risk of kidney stones, but identified no clear evidence for an increased risk of cardiovascular disease with vitamin D alone. The relationship between the dose of both nutrients and the risk of incident kidney stones could not be evaluated; in both of the relevant trials,[8,9] however, the combined calcium intake from study medication and personal intake outside of the study was relatively high, often more than 2000 mg per day.

In the companion recommendation statement,[3] the USPSTF updated and revised its earlier favorable assessment of vitamin D supplementation for fall prevention in 2012[10] to a current recommendation "against vitamin D supplementation to prevent falls in community-dwelling adults 65 years or older (D recommendation)." The latter conclusion was based on inconsistent findings from 5 trials and likely influenced by evidence from a single trial that tested a large bolus dose of 500 000 IU of vitamin D annually[11] and reported increased risks of both falls and fractures with this treatment among community-dwelling adults at increased risk of falling. As alternative strategies, the USPSTF panel recommended, with moderate evidence, "exercise interventions to prevent falls in community-dwelling adults 65 years or older who are at increased risk for falls (B recommendation)."[3] The exercise interventions evaluated were heterogeneous. Some exploratory analyses, which should be interpreted with caution, suggested that interventions that included group-based exercise, those with multiple components, and interventions including a strength or resistance component may be more effective. Common components of effective exercise interventions included training related to gait, balance, functional status, strength, flexibility, and endurance. The most common frequency of exercise interventions was 3 sessions per week.

The USPSTF recommendation, with increased emphasis on exercise, warrants adoption and should prove helpful, especially because exercise interventions reduce injurious falls. Moreover, the emphasis on physical activity should improve general health by reducing risks of other chronic diseases of aging, including coronary heart disease, stroke, type 2 diabetes, vascular dementia, and even cancer, as well as reducing the burden of mobility disability.[12,13] A further recommendation, albeit with a lower level of evidence, concerned the implementation of multifactorial interventions. These interventions include an initial comprehensive assessment of modifiable risk factors for falls, such as the evaluation of balance, gait, vision, medication use, postural blood pressure, cognitive and psychological health, and

environmental factors. An individualized and tailored intervention is then developed, targeted to identified deficits. Multifactorial interventions may include components such as correction of vision or hearing deficits, nutritional therapy, medication management, home or environmental modifications, psychosocial interventions, and cognitive training, as well as exercise. Such multifactorial interventions were found to reduce the number of falls but not the number of falls with injuries.

Notably, the USPSTF recommendations apply only to community-dwelling and asymptomatic adults not known to have osteoporosis or vitamin D deficiency or to be at high risk of fracture. Thus, for patients at increased risk for osteoporosis, those with vitamin D deficiency, or both, it remains reasonable to consider vitamin D supplementation (800-1000 IU/d or more), consistent with recommendations of other professional societies such as the US Endocrine Society[14] and National Osteoporosis Foundation.[15] The literature is also supportive of a benefit of vitamin D supplementation in vulnerable populations, such as older adults living in institutions, other older adults at high risk of fracture, and those with vitamin D deficiency.[16,17] The presence of major risk factors, such as a previous history of falls, age 75 years or older, and problems with mobility, gait, or balance, can help identify older adults at increased risk for fall injuries.[3,18] A brief assessment of physical function using a Timed Up and Go test or a Short Physical Performance Battery can also be helpful for identifying high-risk patients.[3,18]

The USPSTF concluded that more evidence is needed to determine whether higher doses of vitamin D supplementation may be beneficial for primary fracture or fall prevention. To that regard, there will be a substantial increase in the available data on vitamin D supplementation among community-dwelling adults over the next year from 2 large double-blind randomized clinical trials (Vitamin D and Omega-3 Trial [VITAL; NCT01169259] in the United States and DO-HEALTH [NCT01745263] in Europe), both testing 2000 IU daily vitamin D_3 vs placebo. In addition, 2 other large ongoing clinical trials are expected to present their findings within 2 years (FIND in Finland, testing 1600 IU and 3200 IU vitamin D daily vs placebo [NCT01463813], and D-Health in Australia, testing 60 000 IU of vitamin D monthly vs placebo [ACTRN12613000743763]). The European DO-HEALTH trial, being conducted among healthy adults 70 years or older, is also testing a home-based exercise and strength program for the prevention of both falls and fractures. Last, 2 large cluster randomized pragmatic trials, Strategies to Reduce Injuries and Develop Confidence in Elders (STRIDE; NCT02475850) and the Prevention of Fall Injuries Trial (PreFIT; ISRCTN71002650), are evaluating the clinical effectiveness of multifactorial strategies in preventing fall injuries. Thus, clinicians will soon have more data to guide their treatment decisions in these important areas.

ARTICLE INFORMATION

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